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A new species of *Nothochodaeus* Nikolajev, 2005 from Luzon Island, Philippines (Coleoptera: Scarabaeoidea: Ochodaeidae)

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Nothochodaeus;
Taxonomy;
new species;
Luzon Island;
Philippines.

Abstract. – *Nothochodaeus cabrasae* Huchet & Mapile, **new species**, from Luzon Island, Philippines, is described, illustrated and compared with the most morphologically closely related species. A distribution map illustrating the Ochodaeidae species recorded in Luzon is included.

Huchet J.-B. & Mapile D.O.R., 2025. – A new species of *Nothochodaeus* Nikolajev, 2005 from Luzon Island, Philippines (Coleoptera: Scarabaeoidea: Ochodaeidae). *Faunitaxys*, 13(18) : 1 – 8.

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Introduction

The Philippine archipelago represents a prime setting for studying evolutionary and biogeographic processes in an island context. As one of the world's most biologically diverse regions, it exemplifies the principles of island biogeography (MacArthur & Wilson, 1967), with high levels of endemism driven by complex geological and climatic histories. Its position at the convergence of the Eurasian and Pacific plates, combined with its tectonic history and climatic fluctuations, has fostered the emergence of remarkable biodiversity, characterized by one of the highest endemism rates in the world (Dickerson, 1928; Heaney & Regalado, 1998; Myers et al., 2000; Lohman et al,. 2011; Vallejo, 2014). The geographic isolation of the islands, coupled with Quaternary glacial and interglacial cycles, shaped species diversity through alternating phases of land connection and fragmentation (Heaney, 1985; Voris, 2000). During periods of lowered sea levels, the formation of Pleistocene Aggregate Island Complexes (PAICs) facilitated biotic exchange, while subsequent marine transgressions promoted isolation and allopatric speciation (Heaney, 1985; Robles, et al. 2014). These bathymetric variations alternately enhanced gene flow and triggered divergence, contributing to complex diversification patterns. While vertebrates such as mammals (Heaney, 1986; Heaney et al., 1998, 2002, 2005, 2016; Esselstyn et al., 2004; Esselstyn & Brown, 2009; Jansa et al., 2006), reptiles (Siler et al., 2010; Brown et al,. 2002, 2013), and amphibians (Brown & Diesmos, 2001; Brown et al., 2013; McLeod et al., 2011) have been extensively studied, the exceptional diversity of insects—particularly beetles (Coleoptera)—remains comparatively underexplored. As one of the most ecologically diverse and evolutionarily adaptable insect orders, beetles provide valuable insights into biogeographic patterns and speciation processes in the archipelago (Breuning, 1980; Vives, 2009; Santos, 2014; Freitag et al., 2016; Rukmane & Barševskis, 2016; Calcetas & Adorada, 2017; Li et al., 2019; Anichtchenko et al., 2021; Ochi et al., 2021; Ye et al., 2022; Cabras 2022a,b, 2024; Rukmane-Bārbale, 2024, *inter alia*).

Among Philippine beetles, the family Ochodaeidae exemplifies this trend of high endemism. The discovery of the first Philippine representative of *Nothochodaeus* Nikolajev in the late 20th century (Ochi, 1990) initiated a wave of taxonomic studies, leading to the description of multiple new species across various islands (Huchet, 2014a, b, 2017, 2018, 2019, 2021, 2024). These investigations also resulted in the recognition of *Ceratochodaeus* Huchet, 2017, an endemic genus, further underscoring the uniqueness of this insular fauna.

Recently, one of the co-authors (D.O.R.M.) collected a *Nothochodaeus* specimen in Ilocos Sur Province on Luzon Island that led to the identification of a previously unknown species, formally described herein. The specimen was serendipitously captured from a school dormitory at night and was likely attracted by room light. The type locality lies on the lowland area of Ilocos Sur, and much of the neighboring area has been developed as agricultural fields. The province of Ilocos Sur is situated on the western coast of Luzon between the Cordillera Mountain Range and the West Philippine Sea. As with other parts of Western Luzon, the province has a Type I climate characterized as having two pronounced seasons: a dry season from November to April and a wet season for the rest of the year with maximum rainfall from June to September (https://www.pagasa.dost.gov.ph/information/climate-philippines). This new species exhibits strong morphological affinities with *N. minotaurus* Huchet, 2021, recently described from Palawan (Huchet, 2021). Its discovery further highlights the still incomplete knowledge of Philippine Ochodaeidae and raises

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questions about the historical biogeography of the group. Despite increased taxonomic efforts and expanded fieldwork in recent years, it is likely that additional species remain to be discovered and described, reinforcing the Philippines as a priority area for biodiversity research and conservation.
Given the biogeographic distinctiveness of Palawan, which shares faunal affinities with Borneo, we will propose scenarios to elucidate the distributional patterns and evolutionary history of these two morphologically closely related species.

Material and Methods

The specimen described in the frame of this study was compared with other Philippine, Indonesian and Malaysian species deposited in the Muséum national d'Histoire naturelle, Paris, France (MNHN), and the author's private collection (CJBH). This comparative material notably included four specimens of *Nothochodaeus minotaurus* Huchet, 2021: the holotype, two paratypes, and one non-type specimen. Label data of type specimen are transcribed verbatim, with each label denoted by a letter (a, b, etc.), and each line of the label separated by a slash.

Acronym used. – UPLB: Museum of Natural History, University of the Philippines Los Baños, Los Baños, Laguna, Philippines.

Genitalia treatment. – After removal of the entire abdomen to avoid any damage of the genital parts and other informative features, the female genital apparatus was treated with 10% potassium hydroxide solution (KOH) to destroy and remove the unnecessary soft tissues. The cleaned genital parts were then placed in 10% potassium hydroxide (KOH) solution for 1-2 hours. After this treatment, the female genitalia are then immersed in acetic acid for several minutes to neutralize the KOH, followed by rinsing in 90% alcohol. The dissected genitalia are subsequently included in a small drop of DMHF (Dimethyl Hydantoin Formaldehyde resin) on a glue board which is pinned beneath the specimen (Bameul 1990). Finally, the abdomen was returned to its original position and maintained in anatomical position using a small drop of hydrosoluble glue. The terminology for the female genitalia follows Dupuis (2005).

Illustrations. – Digital images of the habitus and external morphological parts were taken at the Entomology department (MNHN, Paris) with a Canon E0S 6D digital camera (zoom MP-E 65 mm) mounted on a Kaiser RTx column. The z-stepper was controlled through the focus stacking software Helicon Remote 3.8.6w and images were processed using Helicon focus 8. Photos of the female genitalia, pronotal, and elytral punctation were captured with a Canon EOS 60D camera mounted on a Nikon SMZ 1500 stereomicroscope (HR plan apo 1X WD 54 Microscope objective lens). The z-stepper controlled manually and images were processed using EOS Utility. The digital images were then imported into Adobe Photoshop CC 2019 and Adobe Illustrator CS4 for post-processing, labelling and plate composition.

Taxonomic Treatment

***Nothochodaeus cabrasae* n. sp.**

(Fig. 1-6, 8-9, 12-13, 16)

ZooBank: https://zoobank.org/95C32972-0842-437F-9C48-1776C0F0B384

Holotype, ♀ (UPLB), labeled:

a) rectangular, white paper, printed: "PH: Luzon, Ilocos Sur, / San Ildefonso, Pob. East, / PSHS-IRC / 08.vi.2023 / leg. DOR Mapile";

b) rectangular, yellow paper, printed: "DME OLD-016 / in coll. DOR Mapile;

c) rectangular, white paper, printed: "UPLB-MNH / COL-03796";

Fig. 1. *Nothochodaeus cabrasae* **n. sp.**, female holotype, habitus, dorsal view, and labels.

Fig. **2-5**. *Nothochodaeus cabrasae* **n**. **sp**., female holotype.
2. Habitus, latero-dorsal view. **3**. Head, dorsal view. **4**. Head, ventral view. **5**. Frontal view, illustrating the two acute clypeal tubercles.

Fig. **6-7**. *Nothochodaeus* sp., female terminalia.
6. *Nothochodaeus cabrasae* **n**. **sp**., female holotype. **7**. *Nothochodaeus minotaurus* Huchet, 2021 (**Cx**: coxite; **Ep**: epipleurite; **Sc**: subcoxite; **Te**: tergite).

d) rectangular, red paper, printed: "HOLOTYPE";

e) rectangular, red paper, printed: "*Nothochodaeus* / *cabrasae* n. sp. / HOLOTYPE / Huchet & Mapile 2025".

Genitalia included in a small drop of DMHF on a glue board pinned beneath the specimen (Fig. 6).

Diagnosis. – Body medium-sized, robust, and convex. Dorsal surface slightly lustrous, uniformly chestnut-brown, densely pubescent. Head quadrituberculate, bearing two distinct acute tubercles on either side of the clypeal carina and two additional, barely perceptible, flattened tubercles on the vertex. Stridulatory peg present.

Description of the holotype (Fig. 1-6, 8-9, 12-13)

Length. – 8.7 mm (from the apex of the mandibles to the apical part of tergite VIII).

Width. – 4.6 mm (greatest elytral width).

Head. – Entirely brown-orange, densely granulate, with setiferous granules closely spaced but non-touching. – *Surface* coarsely punctate, rough, with setiferous pores. – *Labrum* transverse, bearing two rows of setigerous granules curved backward; anterior margin deeply emarginate medially, sides rounded, hyaline, entirely fringed with forward-directed curved setae. – *Eyes* very large, globose, occupying almost the entire width of the head. – *Anterior clypeal membrane* trapezoidal, transverse, hyaline. – *Clypeus* subtrapezoidal, declivous anteriorly, subvertical; anterior margin distinctly beaded, pubescent along the edge; separated from the frons by a fine, inverted U-shaped carina connecting two well-developed, conical paramedian tubercles, rounded and darkened apically. – *Tubercles* delimited posteriorly by the clypeofrontal suture, visible from the anterior margin at antennal insertion to the inner base of each tubercle, effaced medially; a deep median depression present between the tubercles, posterior to their anterior suture. – *Frons* bituberculate, with flattened, obsolete tubercles. – *Mandibles* falciform, subequal, with the external margin evenly curved and acuminate apically; dorsal surface deeply concave, with the external margin and apical tooth darkened. – *Mentum* convex in the median part and basal third; base straight, finely margined; median convexity arched at mid-length; sides strongly depressed on both sides of the median area, densely pubescent; anterior part with a median groove distinctly widening towards the anterior edge. – *Labium* with 3-segmented palpi, the median palpomere densely pubescent on its inner side. – *Maxillae* with 4-segmented palpi. – *Antenna* 10-segmented, club 3-segmented, with the outer antennomere distinctly brightened and pubescent at the upper edge.

Pronotum. – Transverse, convex, entirely margined, with the margin distinctly expanded medially at the base, forming a transverse bulge extending on both sides up to the level of the humeral callus. – *Lateral edges* and base fringed with long setae. – *Anterior margin* slightly convex behind the head, bordered anteriorly by a thin hyaline membrane. – *Front* angles obtuse; posterior angles evenly rounded. – *Pronotal surface* matte, with densely packed, close-set punctation consisting of small, foveolate, slightly rough, setose punctures, spaced approximately 1 to 1.5 × their diameter apart (Fig. 8-9).

Scutellum. – Sublinguiform, weakly depressed in front, surface slightly concave, with a few scattered, setose, medium-sized punctures.

Elytra. – Transverse, densely pubescent, of the same color as the pronotum. – *Surface* marked by well-impressed striae composed of large, sunken punctures spaced approximately one diameter apart; each puncture rather deep and round, bearing a very short, non-erect bristle along the internal anterior edge. – *Interstriae* slightly convex, densely and strongly punctate, with small setose granules whose setae are directed backward (Fig. 12-13). – *Juxta-sutural interstria* distinctly depressed, with its internal margin darkened. – *Humeral callus* well developed.

Abdomen. – Strongly convex, with six visible ventrites (III-VIII). – *Ventrites* smooth and shiny, with few sparse, minute granules, shortly pubescent. – *Anterior margin* with a row of large, setiferous granules spaced 2-4 times their diameter apart. – *Tergite* VIII (pygidium) convex, with large, setose punctures not uniformly distributed; setae denser in the apical part. Stridulatory apparatus present (sternite VI).

Legs. – *Protibia* tridentate externally, with the basal tooth spinose and pointed; inner apical angle of protibia bearing a short, acute pollex directed anteriorly. – *Median* and *posterior tibiae* densely pubescent. – *Hind leg* with basal tarsomere (I) longer than tarsomeres II-V combined.

Genitalia (Fig. 6) – *Female terminalia* weakly chitinized. – *Gonopod* IX dimeric (one subcoxite and one coxite on each side), with terminal stylus IX absent. – *Subcoxite* IX barely sclerotized, roughly triangular, bearing three long setae at the apical end of the ventral edge. – *Coxite* IX elongated, digitiform, with about twenty long setae.

Sexual dimorphism. – Unknown.

Etymology. – This new species is named in honor of our late esteemed colleague, Dr. Analyn Cabras [1986–2024], a dedicated specialist in Philippine weevils. Her invaluable contributions greatly advanced the study of Coleoptera in the Philippines, and her legacy will continue to inspire future research.

Distribution. – Only known from the type locality (Ilocos Sur, Luzon).

Differential diagnosis. – *Nothochodaeus cabrasae* **n**. **sp**., is extremely close morphologically to *N. minotaurus* Huchet, 2021, from Palawan. It is primarily distinguished by its pronotal and elytral punctation, which is distinctly stronger and denser (Fig. 8-15). Additionally, the female genitalia differ in the shape and setation of gonopod IX (Fig. 6-7; Table 1). Based on the examination of four specimens of *N. minotaurus*, no significant variation was observed in the characters used here to distinguish the two species.

Discussion and conclusion. – This newly described species is the second representative of the genus *Nothochodaeus* recorded from Luzon, bringing the island's Ochodaeidae fauna to a total of three species distributed across two distinct genera: *Nothochodaeus matsudai* (Ochi, 1990), *N. cabrasae* **n**. **sp**., and *Ceratochodaeus montgomeryi* (Huchet, 2018) (Fig. 16). Luzon, the largest island in the Philippine archipelago, exhibits remarkable ecological diversity, a complex topography, and a pronounced altitudinal gradient that fosters endemism. Its major mountain ranges (Cordillera Central, Sierra Madre, and Zambales Mountains), covered with dense tropical forests—often fragmented and still insufficiently surveyed—provide highly suitable habitats for biodiversity exploration.

From a biogeographic perspective, the discovery of this new species raises several questions. The strong morphological affinities between *Nothochodaeus cabrasae* **n**. **sp**., and *N. minotaurus* from Palawan provide indisputable evidence of past biogeographic exchanges

Table I. Female terminalia. Comparison of female gonopod IX chaetotaxy between *Nothochodaeus cabrasae* **n**. **sp**. and *N. minotaurus* Huchet, 2021.

Species	Number of bristles on gonopod IX	
	Subcoxite	Coxite
Nothochodaeus cabrasae **n**. **sp**.	3 long bristles	20
Nothochodaeus minotaurus Huchet, 2021	2 long, and one short bristles	16-18

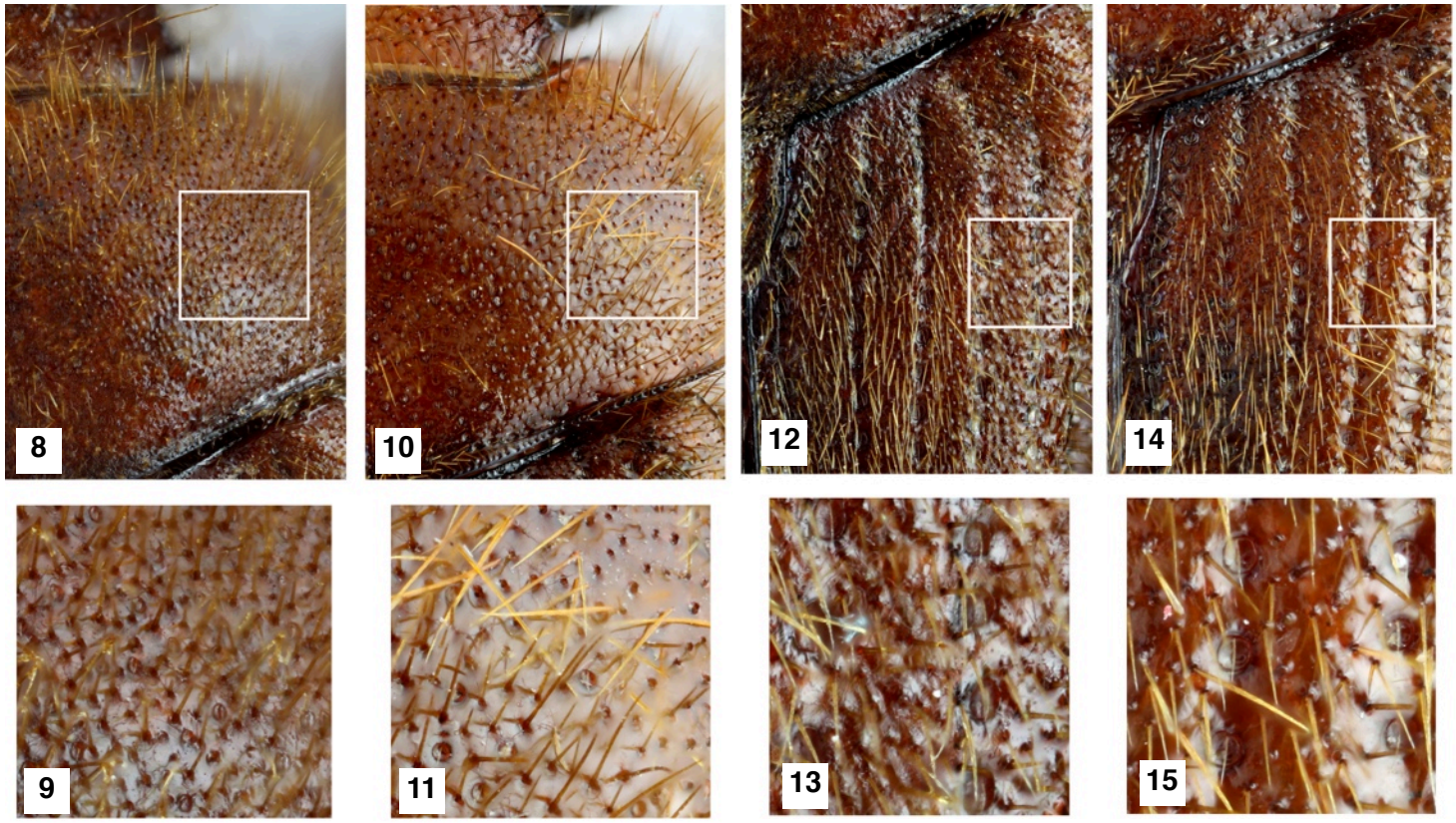

Fig. **8**-**11**. *Nothochodaeus* sp., comparison of pronotal punctuation.

8. *Nothochodaeus cabrasae* **n**. **sp**., female holotype. **9**. Same, close-up. **10**. *Nothochodaeus minotaurus* Huchet, 2021. **11**. Same, close-up.

Fig. **12**-**15**. *Nothochodaeus* sp., comparison of elytral punctuation.

12. *Nothochodaeus cabrasae* **n**. **sp**., female holotype. **13**. Same, close-up. **14**. *Nothochodaeus minotaurus* Huchet, 2021. **15**. Same, close-up.

between these insular entities. However, while Palawan functioned as a key biogeographic corridor, facilitating the passage of flora and fauna from mainland Asia (via Borneo) to the Philippines, Luzon remained more difficult to access due to its geographic isolation.

The timing and mechanisms of faunal exchanges between Palawan and Luzon remain open questions. While Palawan was directly connected to Borneo via a land bridge formed by the Sunda Shelf during the Pleistocene (Woodruff, 2010), a direct terrestrial connection to Luzon appears unlikely due to intervening marine depths (Heaney, 1986). However, biogeographic studies of Philippine flora suggest that dispersal events occurred over much longer timescales. The phylogeographic study of *Begonia* sect. *Baryandra* (Hughes et al., 2015) indicates that this group colonized the Philippines via long-distance dispersal from western Malaysia in the late Miocene (~8.5 Ma), with subsequent diversification and dispersal events occurring throughout the Pliocene and Pleistocene. This suggests that some plant groups may have reached Luzon over extended periods, possibly via stepping-stone islands such as Mindoro and Panay.

Regarding fauna, however, dispersal routes remain uncertain, as available studies do not provide conclusive evidence of specific trajectories. If biotic exchanges between Palawan and Luzon occurred, they were likely facilitated by a network of intermediary islands acting as biogeographic corridors, gradually enabling species establishment on Luzon. This noteworthy discovery thus underscores that the biogeographic history of the Philippines is far from being fully elucidated.

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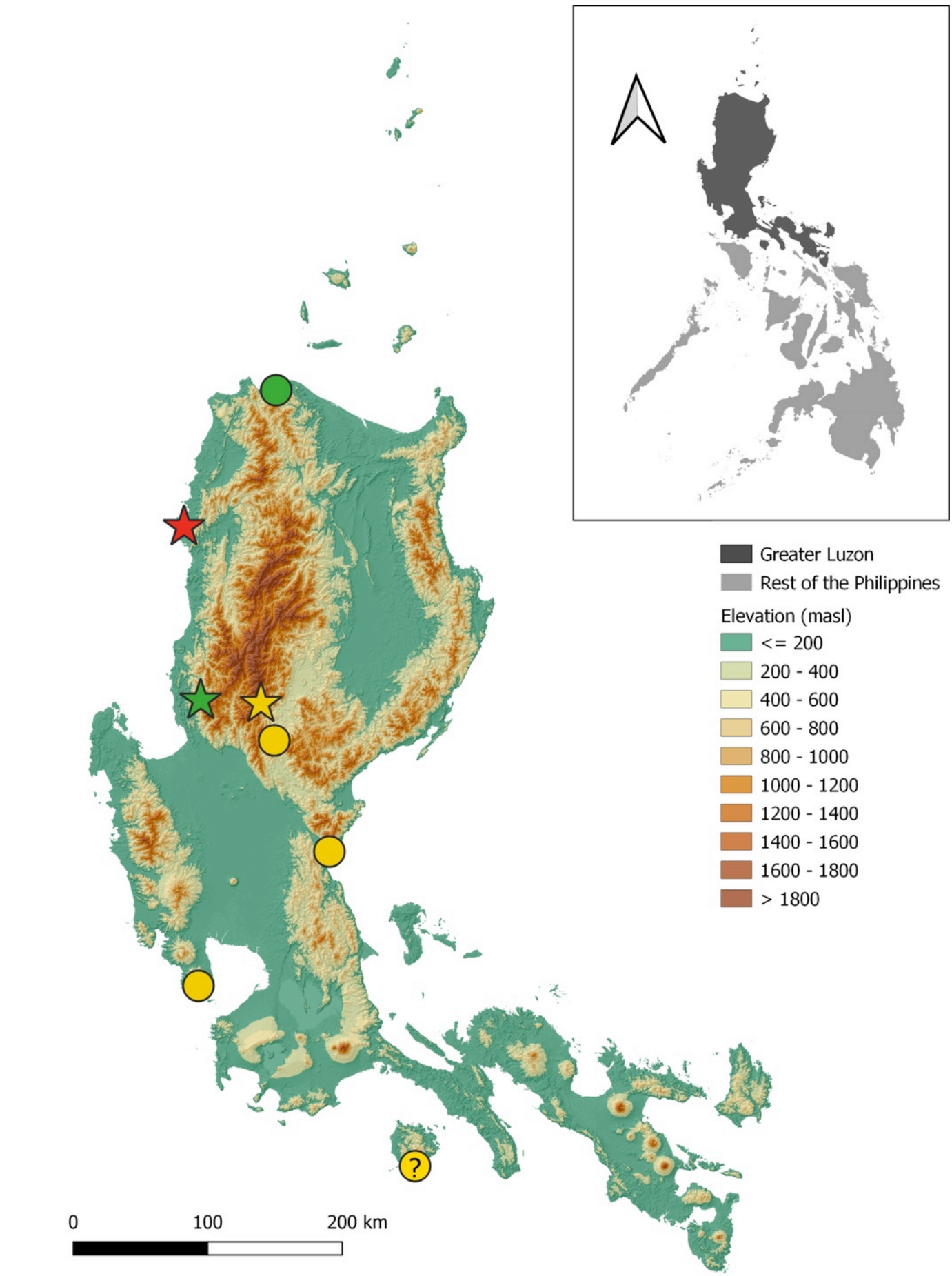

Fig. **16**. Distribution map of *Nothochodaeus cabrasae* **n**. **sp**. (red), *N. matsudai* (Ochi, 1990) (green), and *Ceratochodaeus montgomeryi* (Huchet, 2018) (yellow) in Greater Luzon, Philippines (stars indicate type localities; question mark indicates dubious records). Inset shows Greater Luzon relative to the rest of the Philippines (Illustration: D.O. Mapile, IBS).

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Résumé

Huchet J.-B. & Mapile D.O.R., 2025. – Une nouvelle espèce du genre *Nothochodaeus* Nikolajev, 2005 de l'île de Luzon, Philippines (Coleoptera: Scarabaeoidea: Ochodaeidae). *Faunitaxys*, 13(18) : 1 – 8.

Nothochodaeus cabrasae Huchet & Mapile, nouvelle espèce de l'île de Luzon, Philippines, est décrite, illustrée et comparée aux espèces morphologiquement les plus proches. Une carte de distribution illustrant les espèces d'Ochodaeidae présentes à Luzon est incluse.

Mots-clés. – Coleoptera, Scarabaeoidea, Ochodaeidae, *Nothochodaeus*, taxonomie, nouvelle espèce, Luzon, Philippines.

Buod

Huchet J.-B. & Mapile D.O.R., 2025. – Isang bagong species ng *Nothochodaeus* Nikolajev, 2005 mula sa Isla ng Luzon, Pilipinas (Coleoptera: Scarabaeoidea: Ochodaeidae). *Faunitaxys*, 13(18) : 1 – 8.

Ang *Nothochodaeus cabrasae* Huchet & Mapile, bagong species, mula sa Isla ng Luzon, Pilipinas, ay inilarawan, binigyang-imahe, at inihambing sa pinakamalapit na morpolohikong kahalintulad nitong species. Naipakita rin dito ang isang pagmamapa na nagpapakita ng distribusyon ng mga species ng Ochodaeidae na matatagpuan sa Luzon.

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SOMMAIRE

Une nouvelle espèce du genre *Nothochodaeus* Nikolajev, 2005 de l'île de Luzon, Philippines (Coleoptera: Scarabaeoidea: Ochodaeidae).

Jean-Bernard Huchet & Decier Oliver R. Mapile . . . . . 1 – 8

CONTENTS

A new species of *Nothochodaeus* Nikolajev, 2005 from Luzon Island, Philippines (Coleoptera: Scarabaeoidea: Ochodaeidae).

Jean-Bernard Huchet & Decier Oliver R. Mapile . . . . . 1 – 8

Illustration de la couverture :

View of the Philippine Science High School - Ilocos Region Campus situated in the Province of Ilocos Sur, Philippines where the type specimen of *Nothochodaeus cabrasae* Huchet & Mapile, **new species**, was colllected, attracted by room light (Photo: D.O.R. Mapile, June 2024).

Crédits:

Jean-Bernard Huchet : Fig. 1-15.

D.**O**.**R**. **Mapile** : Fig. 16 & couverture.

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